



Risk Management

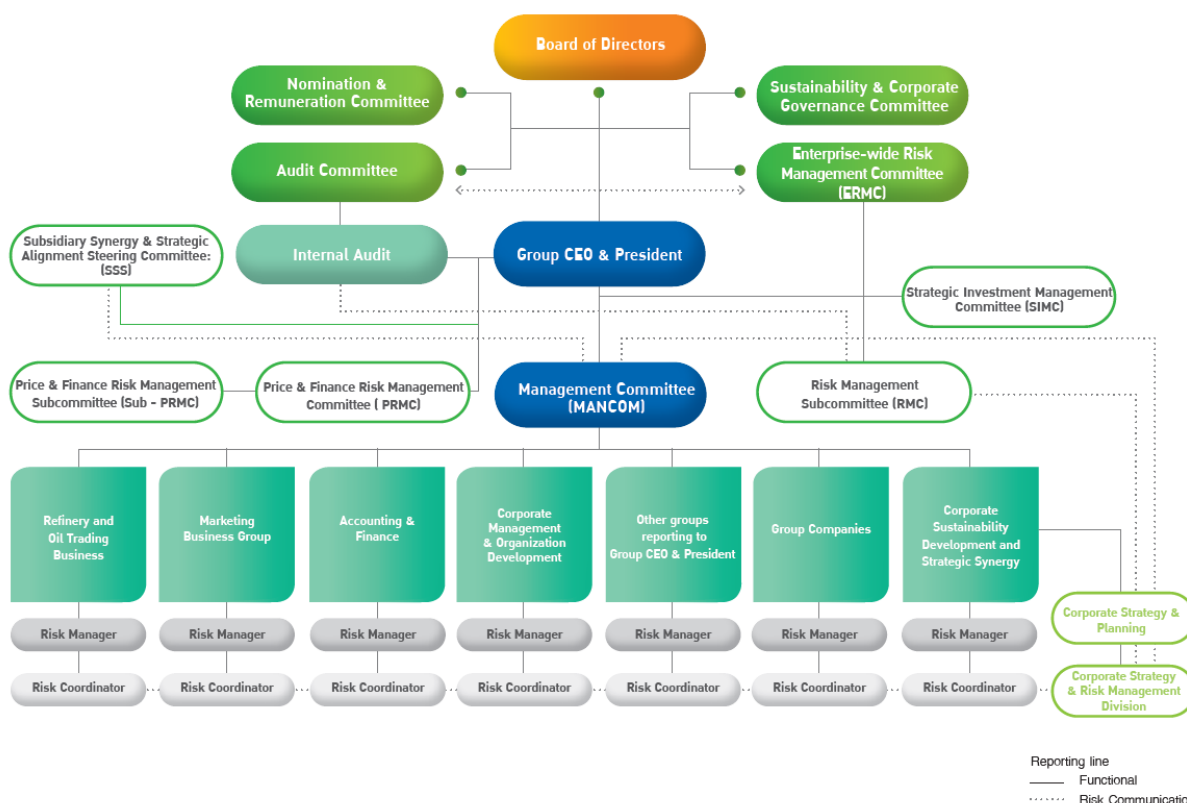
1. Risk Management Policy and Plan

Bangchak has adopted an international integrated enterprise-wide risk management system based on COSO ERM and ISO 31000 for more than 19 years to define management directions and measures to prevent and minimize impacts from a variety of risks preventing it from achieving goals. The risk management system has provided not only the capability for Bangchak to operate all businesses successfully under a relentlessly changing environment but has also warranted confidence among all stakeholders. All executives and staff, as well as joint ventures, fully participate in this international risk management system and aligned with the corporate strategy and planning, as well as the sustainability development policy involving environmental, social and governance (ESG). The company's risks are reviewed quarterly, and the adequacy of Bangchak's risk management processes is audited annually in accordance with the Audit Committee's approval. Furthermore, since 2013, the company has verified and certified on the ISO 22301 to ensure our preparedness to risks and the continuation of business with maximum efficiency under international standards even during crises, as well as high confidence for all stakeholders.

The Senior Executive Vice President of Corporate Sustainability Development and Strategic Synergy who is the highest-ranking person responsible for corporate risk management at the operational level. The Corporate Strategy and Risk Management Division, which is under the Corporate Sustainability Development and Strategic Synergy, reports on corporate risks to Senior Executive Vice President of Corporate Sustainability Development and Strategic Synergy and Risk Management Sub-Committee (RMC), which has the following responsibilities: 1) Develop risk management system and set policy and targets 2) Conduct, review and approve annual operational risk management plans 3) Review changes in internal and external business environments. The RMC reports risk management performance to the Enterprise-wide Risk Management Committee (ERMC) at the Board level. Responsibilities of the ERMC include: 1) Setup policy, strategies, and target of enterprise-wide risk management 2) Develop effective enterprise-wide risk management system 3) Provide support to create risk management collaboration at all



levels 4) Ensure that the Company has appropriate and efficient risk management 5) Report findings from the ERMC to the Board of Directors. 6) Perform other tasks as assigned by the Board of Directors. Moreover, the highest-ranking person with responsibility for monitoring and auditing risk management performance on an operational level is the Vice President of the Internal Audit Department, responsible for reports findings on risk-based internal control and risk management process review to the Audit Committee (AC) at the Board level. The responsibilities of the AC in the area of corporate risk management are to ensure the suitability and efficiency of the internal control system and internal audit for managing enterprise-wide risks and to govern risk management independently. Another AC's responsibility is to communicate with the ERMC to make a good understanding of significant risks connected to the internal audit and facilitate risk management initiatives. The reporting lines and organizational network are illustrated below.



Remark:

Risk Manager – Vice President / Designated person

Risk Coordinator – assigned by Senior Executive Vice President / Executive Vice President



Risk Management Outcomes

In 2022, many countries around the world, including Thailand, faced economic uncertainties, slower-than-expected economic recovery due to various factors such as the outbreak of COVID-19 at the beginning of the year, the escalation of geopolitical violence, Russian sanctions after the start of the Russo-Ukrainian War, continuously high inflation and energy prices, and disruptions in the supply chain leading to high price of consumer goods. Furthermore, the depreciation of the baht and global climate change added to the challenges faced by Thailand, which also experienced flooding in many areas. However, Bangchak, including joint-venture companies, had prepared an enterprise-wide risk management plan to mitigate the impact on the business. It monitored and tracked the overall effect to keep risk levels acceptable and prepare for a volatile future business landscape. Bangchak developed a risk management plan in parallel with the operating strategy. It planned 2 scenarios in response to potential situations to ensure adaptability to changing circumstances.

In addition, for business continuity and sustainability, Bangchak reviewed trends and business factors that are expected to change and impact business (Mega Trends and Global Risks) to manage them in the medium term and long term, including competition in the business and industry, economic situation, consumers' behavior, the surroundings and climate change due to global warming, energy transition, energy security and technological and innovation growth, including alternative & renewable energy, energy storage, electric vehicle, biological technology, and policies of the public sector. These studies have been integrated with primary data of stakeholders' expectations and needs for further analyses of future impacts and directions of risk management in parallel with integrated corporate strategy to strive for mutual sustainability.

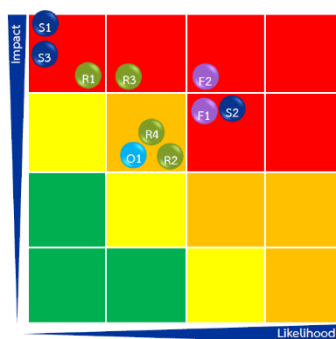
1.2 Risk Factors in the Company's Business Operations

Bangchak has grouped its risk management framework into 1) corporate risk management, 2) project investment risks, and 3) business continuity management. This framework helps formulate appropriate risk management system and assessment. Below is a progress report in these three areas.



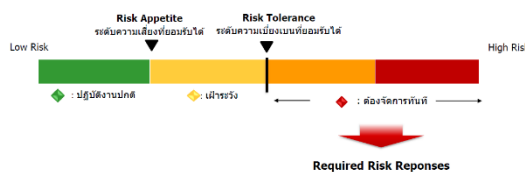
Organization Risk Management

Corporate risk management includes management of all internal and external risks incorporated with an assessment of future trends which could affect the organization in the short, medium, and long terms. The system incorporates risks in strategy, operation, finance, and reputation. The company's risk has been prioritized by the potential impact and likelihood by using levels of risk matrix including very high, high, medium, and low risks. The system is managed with specific key risk indicators (KRIs), risk Appetite and risk tolerance to monitor and track the likelihoods and severity of all identified risks and provides treatment plans to mitigate and minimize the risks and drive operations to succeed as planned.



Risk Monitoring by Key Risk Indicator (KRI)

Risk Appetite and Risk Tolerance Identification



An example of a financial risk, the event shows that inventory loss due to oil price fall has a significant influence on business EBITDA and this event has a very high-risk level. To monitor and track, use the Dubai price (\$/BBL) as a KRI, and if risk appetite is more than 80 (\$/BBL), risk tolerance is more than 70 (\$/BBL). The mitigation actions are stock level control, crude price management, and optimization. For the reputation risk type, the major incident in production that may impact on the company's reputation have been determined and prioritized as a very high-risk level. The number of incidents is used to manage as KRI and monitor by the number of community complaints if there are more than one case (risk tolerance). This risk occurrence is effectively mitigated by implementing the process safety management system.

The financial and non-financial sensitivity analysis are also included in the risk management process. Example of financial sensitivity analysis shows that every change of 0.1 USD/Barrel of GRM, it will impact on approximate 65 million THB of core PAT. Also, non-financial



sensitivity analysis e.g., flood risk for assessing operational risk that if water level higher than 1.7 m., it will impact on refinery operation and service station closing. In 2022, Bangchak has the following 5 risk categories (strategic, operational, financial, reputation, ESG risks):

Strategic Risks

Risk of Economic Uncertainties and High Energy Prices (Emerging Risk)

Due to the supply chain bottleneck and ongoing war between Russia and Ukraine, the prices of energy and consumer products are high, with inflation exceeding the target levels of many countries around the world. Moreover, many central banks have implemented tight monetary policies to stabilize the retail prices of oil in their countries, resulting in the fluctuation in gross refinery margin, stock gain/loss, and unadjusted oil price at service stations. Accordingly, the company has developed a risk management plan as follows:

- Oil refineries and oil trading businesses will closely monitor oil price fluctuations and partially prevent oil price risks and procure funds sufficiently to support the procurement of oil for the oil trading business through BCP Trading Pte., Ltd. (BCPT).
- To respond to uncertainties, oil refinery and oil trading businesses will move toward the development niche refinery products by transforming unconverted oil from hydrocracking units into the starting substances for the production of lube base oil and paraffin wax for the candle, paper wax, and adhesive industries by changing the molecular breakdown unit to increase the production capacity of UO to 75 million liters per month. Additionally, the company has changed the control values of production processes in the production of solvents under the BCP White Spirit 3040 brand, with low aromatics value, to use as starting substances for the products for the paints, thinners and resin industries. Also considering procuring crude oil from multiple production sources at appropriate times, with consideration for appropriate quality with production to ensure good refinery values and add value to the business.
- Marketing Business Group successfully maintained its status as the 2nd market share leader (according to the Department of Energy Business) by achieving the goal of unique design for each station in combination with the Bangchak brand identity. Bangchak had 1,343 service stations saw



upgrades to their work standards to achieve maximum customer satisfaction and retain the number one ranking in the Net Promoter Score (NPS) through customer empathy, customer relationship management, and development of services, as well as through the use of digitalization to deliver positive experiences to service users under the Your Greenovative Destination concept. They are also focusing on continuously expanding non-oil businesses with business partners. For this year, Inthanin coffee shops had a goal to expand branches inside and outside of service stations. As a result, by the end of 2022, they had a total of 1,002 branches.

- BBGI Public Company Limited has consistently adjusted its biodiesel production capacity to meet changing market needs, in alignment with the government's changes in the diesel mixture requirements.

Risk of pandemic that impact on the new business investment.

Investments in new businesses of the company group are a critical driving factor for a large turnkey business expansion. On the other side, an unmanageable epidemic could have a huge impact on unattainable new business investments and organizational goals. The company regularly evaluates investment projects and adapts the investment strategy to focus on the potential market and acceptable profits.

Risks of energy innovation transformation

Transformation of energy innovation is an external factor shaping Bangchak's businesses. Bangchak has therefore developed risk assessment and converted advancement of energy innovation into business opportunities as follows:

- Established a green ecosystem to drive Bangchak Group's innovations with an emphasis on green energy and bio-based products through Bangchak Initiative and Innovation Center (BiIC)
- BBGI Public Company Limited has expanded and increased the production capacity of the ethanol biofuel production business. And also has a project to continuously improve the production effectiveness of biodiesel and ethanol. Currently, Bangchak producing pure glycerin with a production capacity of 80 tons per day. Additionally, producing other related products



such as medical-grade hand-sanitizing alcohol to increase the value of the products. BBGI is a major biofuel business operator and distributor in Thailand.

- Expanded business into high-value bio-based products through BBGI Public Company Limited by investing in Manus Bio Inc., a leader in the production of high-value bio-based products by use of advanced bio-fermentation processes with food ingredient registration certificates for the sweetener Neotame to be distributed in Thailand and Asean. Furthermore, the company established WIN Ingredients Singapore Pte., Ltd. to operate business in the development of bio-based products, and to provide technical and commercial support. Also signed a joint venture contract with Biom Co., Ltd, which is the first biotechnology research and development company of Chulalongkorn University. The joint venture aims to create research value for the high-value bio-based supply chain and to sell dietary supplements under the brand B Nature Plus.
- Promote the initiation of business opportunities from energy innovation through regular campaigns among staff and subsidiaries, through introduction of Design Thinking to help develop new products and services to cope with future changes. To this end, BiiC can act like a business incubator and eventually commercialize selected initiatives.
- Continued to expand the startup service “Winnonie”. Bangchak introduced and rented out electric motorcycles to motorcycle taxi riders and riders who delivered food or parcels. They can swap batteries at swapping stations located in Bangchak service stations. This effort scaled up green energy innovation and improved the riders’ quality of life.
- “Smart Digital Fuel Dispenser Project: Krathing”. Bangchak, in collaboration with Micro Oil and Retail Co., Ltd. and DTAC TriNet Co., Ltd., installed and managed digital fuel dispensers. It also established a communication system for the installation of Krathing dispensers nationwide. As a result, Krathing, serving as a platform providing quality fuel, could reach small communities. This project aimed to promote their access to quality energy that met the required standard. In the future, Bangchak would scale up services other than oil services to improve local people’s quality of life in all aspects.
- BSGF Co., Ltd. (“BSGF”) was established. This company is a joint venture with BBGI (a subsidiary of the company) and Thanachok Oil Lite Co., Ltd. The company was established to procure raw



materials, produce, and sell sustainable aviation fuel (SAF) from used oil. The subsidiary has a starting registered capital of 1.0 million baht, which will be increased in the future. Bangchak, BBGI, and Thanachok Oil Lite hold 51%, 20%, and 29% shares in BSGF, respectively.

Risks of managing human resources for future growth

To support additional investments for security and sustainability of income, Bangchak needs to satisfy higher demand for diversified and highly skilled human resources for each business and to maintain a proper generation gap within the organization to drive future businesses. Managing risks of human resources for future growth to align with business strategies is defined and treated with consistent programs and sessions of lessons learned and knowledge exchange among staff of Bangchak Group. These sessions hone skills, identify career advancement, and sustain business continuity as well as strengthening ties among staff workers and Bangchak. Activities in these sessions are organized and analyzed jointly by the management through the Subsidiary Synergy and Strategic Alignment Steering Committee.

Operational Risks

Risks of managing feedstock and supply chain

Management of risks associated with supply chains and suppliers on delivery of feedstock, raw materials, machines, equipment and related services for the production and distribution is critical to uninterrupted operations, fostering confidence among all stakeholders and giving a competitive.

- Select crude oil from various sources at suitable periods with due regard for appropriate quality for processes that yield healthy refining margins to add business value.
- Develop long-term crude sales agreements with domestic and international suppliers to secure consistent supply for the refinery.
- Stock and procure feedstock for biofuel production from competitive sources with appropriate prices.



- To deal with demand uncertainties in the market, the oil refinery business has turned to developing niche refinery products by increasing the production of UO (unconverted oil) to 75 million liters per month. The company assesses risks related to the adequacy of suppliers by ranking raw material suppliers and providers of high-value services. Also conducts assessments of risks that might cause economic, social and environmental impacts on the organization as a result of suppliers, in order to ensure business continuity across the entire supply chain.

Risks of digital technology transformation and cybersecurity

Risks of digital technology transformation and cybersecurity are external risks that have rapidly evolved, driven by strong business competition, reliance on competitive technologies, and connectivity of hardware and software through Internet technology to raise business efficiency and create good experience for customers, with due regard for the safety of the corporate IT system. Bangchak took action to cater to such technological development and change along with reviewing technological risk issues concerning current business disruption as follows:

- Establish a digital technology unit in charge of planning, monitoring, and procuring proper digital technologies for Bangchak to cope with changes in consumer behavior, work process improvement toward increasing competitive advantages, and adding value and efficiency to its services. The following additional technologies were applied in 2022.
 - The Digital Payment Project, in which digital payment is made in the Mobile EDC (electronic data capture) form to avoid physical contact at service stations by scanning the QR Code to pay through all banks' applications and PromptPay or simply touch and pay with contactless credit cards while accruing Bangchak membership points.
 - Develop personalized marketing by applying data analytics to examine individual consumer behavior to develop tailor-made service patterns specific to each consumer and hence increase customer satisfaction.
 - Promoted the digitalization of working processes to increase efficiency and reduce work time. Bangchak chose digital tools, including Robotic Process Automation (RPA), Power BI or Power App, in work improvement.



- Set up a cybersecurity function, responsible for planning, monitoring, surveillance, testing, and procuring tools to prevent cyber threats, which tended to keep increasing each year. In 2022 the Enterprise-wide Risk Management Committee focused on surveillance and provided risk management in case cyber-attacks disrupted the business process support system. It provided tools to enhance the security of the computer center. Moreover, it designed more secure information infrastructure systems and conducted vulnerability assessments to promptly close gaps. Bangchak kept monitoring key risk indicators through the Security System Alert System. Furthermore, it formulated an incident response plan, created awareness of cyber threats among employees, and regularly conducted testing. Finally, it implemented a secure work system that received ISO 27001 certification for data security management, ISO 27032 for cybersecurity management, and ISO 27018 for personal data security management. In addition, Bangchak develop a refinery cybersecurity system program to safeguard work systems from cyber-attacks or interruptions which might affect refining processes. Since 2020, Bangchak has won ISO/IEC 27001 certification (Information Security Management), covering the refinery's Distributed Control System, thus ensuring that its refining processes will continue uninterrupted despite cyberattacks.

Risks to reputation from social media

With the transformation of the social media platform, where news and information of Bangchak's products and services are exchanged among consumers, moved to online, lightning response rates have become crucial. More importantly, online negative news and distortions could go viral, thus tarnishing Bangchak's reputation. Managing reputation risk therefore demands a dedicated team to relentlessly monitor movements of online social media. These tasks increase communication efficiency under normal circumstance and crises and reduce negative impacts. The system also calls for regular drills to ensure crisis preparedness.

Financial Risks

Risks of volatile prices of oil and feedstock



The risks of volatile prices of oil and feedstock directly affect the revenue stream of Bangchak's core petroleum and petroleum-related businesses. With this in mind, Bangchak manages these risks with short-term and long-term plans as follows.

- Put in place a mechanism to track the movement of the crude oil price, spreads between crude and refined product prices, and regular development of new risk management tools for members of the subcommittee and risk management committee on prices and finance to consider and decide suitable options to manage, and report directly to the executive management committee.
- Diversify risks arising from price fluctuation of agricultural produce through investment in bio-based businesses operated by BBGI to upgrade business competitive edge in biofuels, biodiesel and ethanol, a steppingstone to high-value bio-based product development and value additions to the company.

Risks of volatility of exchange rates and interest rates

Throughout 2022, exchange rates experienced a high level of volatility, and the value of THB relative to USD grew successively weaker since early in the year. This occurred primarily due to strengthening of the US dollar in line with the United States' central bank implementing stricter fiscal measures. In addition, the Bank of Thailand increased policy interest rate 3 times in 2022, from 0.5% to 1.25% at the end of the year. The volatility in exchange rates cause uncertainty in the company's revenues, especially in petroleum related businesses and international joint ventures. However, the company has plans to continuously manage risks from currency exchange rates and interest rates as follows:

- Adopt natural hedges on transactions with international currencies on both income and expenses.
- Manage major costs of capital toward fixed and consistent interest rates.
- Closely monitor movement and trends of international monetary markets to execute proper hedging on exchange rates and interest rates decided by the Risk Management Committee on pricing and finance to ensure successful businesses as planned.



Regulation Risks

Risks from enforcement of the Personal Data Protection Act B.E. 2562 (2019)

The Personal Data Protection Act B.E. 2562 was announced in the Government Gazette on May 27, 2019 and was postponed taking effect on June 1, 2022. In compliance with the “Personal Data Protection Act B.E. 2562”, the company considered the appointment of a data protection officer (DPO) and a working committee to support the data protection officer (DPO office) composed of representatives from related work sections to work in providing consultation and recommendations about personal data protection and to verify activities related to the processing of personal data and to coordinate and collaborate with the Personal Data Protection Office and personal data owners.

Environmental Social and Governance Risks

Risks of impacts on communities and society (Emerging Risk)

Bangchak is fully committed to operating its businesses in a friendly way with communities, the public and the environment in a sustainable way and is conscious of risk management to minimize the impact on safety and the environment. Work processes have therefore been continuously upgraded to ensure safety and zero impact on communities and the public under the following risk management plan.

- Constantly developed a system for occupational health and safety of international standard to upgrade health and safety in the workplace while systematizing work processes with due regard for risks, opportunities, and legal requirements. Bangchak was certified with ISO 45001, ISO 14001, and ISO 50001.
- Routinely conduct risk management with systems of Safety Integrity Level, Reliability Centered Maintenance, and Risk-Based Inspection to ensure the efficiency of all equipment and work processes for accurate preventive maintenance programs.
- Perform hazard and operability study assessment and install the process safety management system at all procedural levels of refining processes in conjunction with leading engineering consulting firms to ensure international work standards and practices.



- Install an online air quality metering system with automatic display on all monitors in the refinery and its vicinity for the communities surrounding the facilities to get real-time air quality information, leading to higher public confidence in Bangchak's operation.
- The company organizes activities to provide knowledge and understanding, and to instill safety consciousness in the surrounding communities of refineries, especially in schools and condominiums. This is achieved through lectures on evacuations, fire-extinguishing, and basic first-aid, and the company has also extensively installed communications and warning systems in communities.

Furthermore, in governing businesses operated by joint venture companies, the company monitors and surveils the risks that might occur and impact communities in each area. This is done to prevent communities and society from suffering from any trouble or negative impacts from production processes or work. For example, the company monitors risks with wastewater management and organizes CSR activities with surrounding communities continually, with the organization risk management committee responsible for monitoring the outcomes of these activities throughout the year.

Risks of climate change and environmental change leading to GHG reduction measure (Emerging Risk)

Because business operations potentially cause global warming, Bangchak took action to focus on reducing energy consumption and GHG and carbon dioxide emissions as follows:

- Showed commitment to conducting a low-carbon business and leading energy transition. Bangchak has been increasing the proportion of green companies to lower carbon emissions. It also founded the Carbon Markets Club to promote carbon credit trading.
- The company has set a goal to become carbon neutral by the year 2030 and achieve net zero GHG emissions by 2050, according to the NCP 316 NET concept, which covers 4 important guidelines. These guidelines include B = breakthrough performance, emphasis on highly effective and environmentally friendly processes to reduce carbon emissions; C = conserving nature and society to support the creation of ecological balance through natural carbon absorption



techniques; P = proactive business growth and transition to clean energy, using technologies to achieve sustainable growth. Accordingly, Bangchak has received a low-carbon and sustainability business award for the second consecutive year from the evaluation of the Thailand Greenhouse Gas Management Organization, which decided to grant the award based on governance, sustainability report and business size, according to indicators of the economic, environmental and social dimensions, in line with the national sustainable development goals.

- Replace fuel oil with natural gas to generate power and steam in the combined-cycle plant and deploy it as a primary energy source for the distillation units, resulting in higher energy efficiency and reduction of carbon dioxide emissions.
- Bangchak took part in easing pollution in the form of PM 2.5 particulates and smog by selling diesel containing five times less sulfur (lower than 10 ppm), as less sulfur can lower dust problems resulting from combustion along with sulfur dioxide. Such diesel was sold in Bangkok Metropolis during such critical periods.
- Remodel resource consumption with the 3Rs strategy of Reduce, Reuse and Recycle to achieve sustainable and environmentally friendly business success. This includes collection of plastic bottles from customers voluntarily to produce recycled products for society, collection of depleted plastic lubricant containers for recycling to produce polymers and eventually reproduce such containers. These programs are aimed to reduce public waste and sustain the values of resources through reuse and recycling to optimize their values to the environment, society and communities in a sustainable way.
- Lowered plastics in non-oil activities as well as plastic containers by designing lids of cold beverages that eliminates straws. Moreover, the company continuously adopts biodegradable plastic cups (bio-cups) and invites customers to collect used cups to trade for discounts and delivers biodegradable cups to the Royal Forestry Department through the “Kaeo Pho Kla” project with a number exceeding 1 million cups.
- In the “Khaya Kamphra Sanchon” project, the company is committed to caring for the environment and promoting sustainability by supporting waste management according to the circular economy approach, and reducing waste from the source to minimize the social impacts



of land-filled wastes. Furthermore, the company supports proper waste management and reduce air pollution from land-filling by partnering with gas stations that accept orphan wastes to support environmental care. In 2022, over 65 tons of orphan wastes were received through donations at gas service stations in Bangkok. Bangchak continues to be one of the 14 partner members in the “Kep Klong Sang Ban” project to accept donations of beverage packaging to recycle them by into materials for construction various eco-friendly homes such as eco-roofs, eco-door, ecowood and eco bricks. The Friends in Need (of “PA”) Volunteers Foundation and the Thai Red Cross Society donate these home to people suffering from problems caused by natural disasters, underprivileged people and homeless people.

Water Shortage Risk

Water shortage has been identified as an imminent global crisis. Global warming and a booming population are the main causes of uncertainty on available water for consumption. Bangchak has paid its full attention to water management to conserve water in production processes as follows:

- Monitor risks from climate change such as droughts by monitoring and staying vigilant over daily water situations of the Metropolitan Waterworks Authority to assess water shortage risks affecting refining processes, to ensure emergency water supply available for supplementary use in production processes during times of water shortages. Additionally, the company has put measures in place to monitor and deal with risks from drops in the water levels of the Chao Phraya River, which could impact ship navigation and other area. Accordingly, the company takes care to avoid causing impacts on stakeholders from every group that may be similarly impacted by water shortages. It also monitors flood situations such as by arranging for the monitoring and surveilling of water levels in the main rivers during the rainy season. The company inspects the readiness of flood prevention equipment in risky areas and has created risk management plans to support opportunities for growth while ensuring confidence that the business will be able to operate without interruption.
- In 2022 it reduced water consumption by improving tap water quality with a micro-filtration system and a reverse osmosis system, To reuse approximately 1,290,335 cubic meters of



condensate water and water stripped of sulfur for production purposes, and to treat an additional 203,167 cubic meters of wastewater using the reverse osmosis system for recycling purposes, the 3Rs initiatives were able to save water equivalent to the consumption of 4,120 households. In addition, in 2022, the company conducted an assessment of water stress through the AQUEDUCT and ThinkHazard projects, and found that Bangchak's oil refineries are located in a medium-high area (20-40%). According to this definition, the area is not experiencing any significant water stress.

- The company has enhanced its refinery cooling system to improve work efficiency and minimize water losses from the system, resulting in a decrease in the consumption of water from the Metropolitan Waterworks Authority.
- Promote the reduction of water consumption in all production processes with all affiliates and business units, led by the water recycling program by the Bio-based Product Business Group. Moreover, a project of drilling for groundwater was initiated for water storage and supply for the facilities.

Risk of Affiliate ESG Management Misalignment

The importance of ESG management is recognized by the holding company and its affiliates. As a result, the organization conducts ongoing research on megatrends that may have an impact on business operations, revisits ESG targets and policies, develops action plans, and regularly monitors progress.